Blockchain technology and us.

Last year Professor Kris Seeburn wrote that "the underlying technology of blockchains will most likely represent a second era of the internet" (2016). Whether or not this is hyperbole, there is certainly growing interest around the use of blockchain technology in research: Jisc Futurist Martin Hamilton (who will be speaking at the MmIT AGM in January) delivered an excellent webinar in October about blockchain in research & education. Last month Digital Science also published a report about the potential use of blockchain technology for scholarly communication and, as detailed in Information Today Europe, will be offering a grant of up to $30,000 for work in this area. However, the reach of blockchain technology may go far beyond research and have wider implications for librarians and information professionals across all sectors. The purpose of this post is therefore to provide a very brief introduction to blockchain technology for MmIT readers, showing where it may impact on the work that we all do, and bring together some useful links to help you find out more about this emerging technology.

To begin, the blockchain was first devised to enable the use of Bitcoin as a peer-to-peer electronic cash system. It provided an innovative solution to one of the main challenges in establishing a digital currency: the need to create a trusted, reliable system that allowed the transfer of money without having to use third party financial institutions. At a very basic level, that is what the blockchain does – it works as a distributed digital ledger enabling trusted payment from one person to another, with each block acting as an entry in that ledger. As Audrey Watters (2016) explains:

> *Each block aggregates a timestamped batch of transactions to be included in the ledger – or rather, in the blockchain. Each block is identified by a cryptographic signature. These blocks are all back-linked; that is, they refer to the signature of the previous block in the chain, and that chain can be traced all the way back to the very first block created. As such, the blockchain contains an un-editable record of all the transactions made.*

The fact that the blockchain is a distributed system means that no one computer centrally holds and controls all of this information; new blocks are added to the chain through a process of consensus building and validation by the network, analogous to Google Docs (at the time of writing there are over 11,000 nodes in the Bitcoin network). It is this unalterable timestamped chain of blocks, establishing clear and open provenance, that could benefit research and scholarly communications. One relatively straightforward application proposed in the Blockchain for Research report is that "a blockchain could provide a notarisation function by allowing scientists to post a text or file with ideas, results or simply data" (2017, p.8).

To be clear, this is still a fledgling technology. Last month Deloitte Insights reported that in 2016 nearly 27,000 new projects related to blockchain appeared on GitHub (a software development platform) but that "about 90 percent of projects developed on GitHub become idle, and the average life span of a project is about one year, with the highest mortality rate occurring within the first six months" (2017, p.10). Despite this, the appetite for blockchain systems has not diminished; it may only be a matter of time until we see this technology underpinning processes and systems that we need to engage with in our roles as information professionals. For example, some of the proposals and applications to date have concerned:

- **Academic and Professional Certification**: MIT's Media Lab created Blockcerts to issue diplomas to a cohort of their students using blockchain technology.
- **Digital Archives:** The University of Surrey are currently working on the EPSRC funded project 'ARCHANGEL – Trusted Archives of Digital Public Records' with The National Archives and Open Data Institute to develop a blockchain based system that will "ensure the long-term sustainability of digital archives" (2017).

- **Ebook Distribution**: DECENT have put forward a use case for ebook blockchain distribution.
- **Fee Payment:** In 2014 the University of Cumbria became the first institution to accept Bitcoin payment for tuition fees through their Bitpay system.
- **Media Libraries**: San-Diego startup, Blocktech, started a crowdfunding campaign to create the Alexandria decentralized media library using blockchain.
- **Medical Records**: MedRec, a private blockchain on the Ethereum network, was created by researchers at MIT. This allows patients to access their complete medical history, from multiple providers, in one system.
- **Research Data Management**: DaMaHub was a research data management platform using Hyperledger blockchain technologies.
- **Tackling 'Fake News'**: Steve Huckle and Dr Martin White from the University of Sussex have been exploring how blockchains could provide a technological approach to proving the origins of content.

Some of these projects may come to fruition, some may not, but a secure technology that can support payment, accreditation and research integrity is likely to tick many boxes for many institutions. As the list above shows; whether you work in an academic library, health library or public library, developers are starting to think of blockchain applications that have the potential to affect the way that many of us work. Even if these are not realised, at the least, a basic understanding of blockchain technology can help us to better support users looking for information in this area.

In the November/December issue of the Information Management Journal, Victoria Lemieux performs a SWOT analysis of blockchain recordkeeping to see if the hype is justified, concluding that "perhaps the greatest risk will be if information professionals fail to take up the challenge of understanding the capabilities of blockchain-based recordkeeping, allowing its implementation to march ahead without their wisdom and guidance" (2017, p.27). Although it is important that we try to look forward to see how we can continue to best support our users and our sector, it is not always clear how, as individuals, we can do this with limited time or expertise. However, help is at hand – at the MmIT AGM in January we'll be addressing some of these very challenges:

- David Parkes will examine techniques, outcomes and tactical insight in the field of near future work.
- Tabitha Witherick will explore how libraries are uniquely placed to empower people to access, explore and technology in a time when the pace of digital disruption is increasing.
- Martin Hamilton will reflect on the impact for libraries and librarians of some of the defining narratives of the late Anthropocene era: from climate change and failed states to cheap space travel and artificial intelligence.
- Alison McNab will discuss current awareness and trend-watching for information professionals.

So sign up for the MmIT AGM, 'Future Proofing the Library: addressing the issues of today for an innovative tomorrow', to find out what else 2018 may have in store for information professionals like us.